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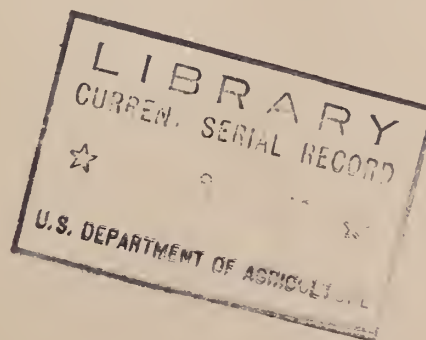
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GUIDE TO THE LITERATURE ON COLLAGEN X

Rubin Borasky



BUREAU OF AGRICULTURAL AND INDUSTRIAL CHEMISTRY  
AGRICULTURAL RESEARCH ADMINISTRATION  
UNITED STATES DEPARTMENT OF AGRICULTURE





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# GUIDE TO THE LITERATURE ON COLLAGEN

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## INTRODUCTION

The term collagen refers to a chemical substance of animal origin. Biologically, collagen is recognized by its preferential staining reactions. The biophysicist recognizes collagen by its x-ray diffraction pattern, and appearance in the electron microscope. Collagen is a natural fibrous high polymer possessing little elasticity but great mechanical strength.

To the chemist, collagen is a simple albuminoid protein, which is, at ordinary temperatures insoluble in water, dilute acids and alkalies, and solutions of salts such as sodium chloride and ammonium sulfate. In its native state collagen is resistant to digestion by certain proteolytic enzymes. Collagen has physico-chemical properties which set it apart from other proteins. These are its characteristic iso-electric point, the property of birefringence, and swelling reactions in acids, alkalis and solutions of certain salts such as barium chloride and calcium chloride. When heated gradually in water, collagen shrinks within a small but well-defined temperature range.

When boiled in water for a sufficiently long time, collagen is irreversibly changed into gelatin, a water soluble protein, having many physical and chemical properties (other than solubility in water) markedly different from its forerunner collagen. Much of our knowledge of the chemistry of collagen, in particular, and proteins in general, has been derived from investigations on gelatin.

Bracconot's discovery of glycine in a gelatin hydrolysate (1820) [749], and Graham's [763] investigations on the diffusion of gelatin solutions (1861-1865) mark the beginning of protein and colloid chemistry, respectively.

A greatly enriched knowledge and understanding of the gross and microscopic anatomy of animal tissues and organs is the result of many studies made on collagenous tissues by investigators since Malphigi founded the science of histology. This is not surprising since collagen is so widely distributed throughout the animal kingdom, and is found in varying amounts in all vertebrate animal tissues and organs.

The leather technologist is concerned with the chemical, mechanical and physical properties of collagen, so that he can modify and control the many processing steps involved in leather manufacture to improve processing efficiency and to obtain desired qualities in the finished leather.

This bibliography was started as an aid in planning and executing experiments, to elucidate the fundamental physical and chemical properties of collagen, so essential for a better understanding of the tanning mechanism, and improvement of tanning practice. The large number of references obtained, and the varied fields of scientific investigation covered by these references, suggested that a bibliography on collagen would be of value to many workers in biological, biophysical, chemical and physical research.

Limiting the references to collagen alone was found to be impossible since the terms gelatin, glue, skin, hide substance, hide powder, connective tissue, tendon and others are very frequently though erroneously used as synonyms for collagen. This is a fortuitous circumstance, since much of our knowledge concerning collagen is based on investigations of the various collagenic derivatives or tissues listed. The strictly non-collagen references have been kept to a minimum as a necessity but it is hoped there are enough such citations to be of use to investigators whether their interests are biological, chemical or technological.

## ACKNOWLEDGEMENTS

Grateful acknowledgement is made of the helpful cooperation received from Miss Miriam W. Huddle, Librarian of the Wyndmoor Branch, U. S. D. A. Library without whose aid this bibliography could not have been compiled. The author is grateful to Dr. J. H. Highberger of the United Shoe Machinery Company, for the use of his card file of references on collagen. The author is also indebted to the many colleagues at the Eastern Regional Research Laboratory who brought collagen references to the author's attention, aided in the translation of titles in foreign languages, and for their encouragement during the preparation of this bibliography.

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Chemical Society London Journal Abstracts	1878-1925
Index Medicus	1879-1926
Surgeon General's Catalog	Ser. 1-4; 1880-1938
Society Chem. Ind. Journal	1882-1925
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Card file of references

J. H. Highberger - United Shoe Machinery Company

## NOTE ON THE CLASSIFICATION OF REFERENCES

References in this bibliography are grouped into four sections. Section I, Biology references, is classified under four headings, and Section III, chemistry references, are classified under twelve headings. Section IV is a supplementary list of references which were obtained from a search of Chemical Abstracts, Biological Abstracts, the Journal of the American Leather Chemists Association, the Journal of the International Society of Leather Trades Chemists, published from January 1947 through August 1949. The citations are arranged alphabetically and chronologically according to author within each classification group. More detailed classification of the references will be found in the subject index, which was made as comprehensive as possible so as to make the bibliography independent of the classification system adopted as a matter of convenience to the author. Each citation was verified by consulting the original source whenever possible. Chemisches Zentralblatt, Chemical Abstracts, Biological Abstracts, and other secondary sources were consulted only when the original source was not available in the libraries of the Philadelphia area. Insofar as possible abbreviations used are those in the United States Department of Agriculture Miscellaneous Publication 334, "Abbreviations used in the Department of Agriculture for Titles and Publications".



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